

IN THE CLAIMS:

1. (Currently Amended) A method of forming a metal layer over a patterned dielectric formed on a substrate, the method comprising:

depositing a first material layer over said patterned dielectric in a gaseous deposition atmosphere including, at least temporarily, a catalytic material, wherein depositing said first material layer comprises establishing said gaseous deposition atmosphere by supplying one or more precursor gases, whereby at least one of said precursor gases includes said catalytic material; ~~and~~

exposing said first material layer to a plating solution including ions of the metal to be deposited, wherein said catalytic material incorporated in said first material layer initiates a reaction to reduce metal ions and to form a metal layer on said first material layer; and

controlling an amount of catalytic material incorporated into said first material layer by controlling at least one of a flow rate and a duration of supply of said catalytic material containing precursor gas.

2. (Original) The method of claim 1, wherein said catalytic material comprises at least one of platinum, palladium, silver, copper and cobalt.

3. (Original) The method of claim 1, wherein depositing said first material layer comprises establishing said gaseous deposition atmosphere by sputtering atoms of said first material and, at least temporarily, catalyst atoms off a target.

4. (Original) The method of claim 3, wherein said catalytic material is substantially uniformly distributed in said target.

5. (Original) The method of claim 3, wherein said catalytic material is provided on one or more distinct portions of said target.

6. (Original) The method of claim 1, wherein depositing said first material layer comprises establishing said gaseous deposition atmosphere by sputtering atoms of said first material off a target and supplying a precursor containing said catalytic material.

7. (Original) The method of claim 1, further comprising adjusting a ratio of atoms of said first material and of said catalytic material in said gaseous deposition atmosphere.

8. (Canceled)

9. (Canceled)

10. (Original) The method of claim 9, wherein said catalytic material containing precursor gas is supplied after a predefined thickness of said first material layer is deposited.

11. (Original) The method of claim 9 or 6, wherein said catalytic material containing precursor gas is supplied after the deposition of said first material layer is discontinued.

12. (Previously Presented) The method of claim 1, wherein at least two different precursor gases are supplied sequentially to deposit said first material layer in a digitally controlled manner.

13. (Original) The method of claim 1, wherein said first material layer comprises a barrier layer substantially preventing diffusion of said metal into substrate portions covered by said barrier layer.

14. (Original) The method of claim 1, further including forming a second metal layer over said metal layer by electroplating, wherein said metal layer acts as a seed layer.

15. (Original) The method of claim 1, wherein said metal layer comprises copper.

16. (Currently Amended) A method of forming a metallization layer, comprising:
depositing a catalytic material over surface portions of a patterned structure by at least one of chemical vapor deposition, physical vapor deposition, atomic layer deposition and plasma treatment;
forming a metal layer above said patterned structure by electroless plating deposition using a plating solution, wherein said catalytic material initiates a reaction between agents of said plating solution; and
depositing a barrier layer on said patterned structure, wherein said barrier layer is deposited by the same deposition technique as said catalytic material and wherein

said barrier layer is deposited by sputter deposition, whereby at least a portion of a sputter target comprises said catalytic material, and wherein said catalytic material is deposited after the deposition of said barrier layer without breaking the vacuum established during the deposition of said barrier layer.

17. (Canceled)

18. (Canceled)

19. (Previously Presented) The method of claim 16, wherein said barrier layer is deposited by chemical vapor deposition, whereby at least at the end of the deposition of said barrier layer a precursor containing said catalytic material is present.

20. (Canceled)

21. (Previously Presented) The method of claim 16, wherein a ratio of barrier material atoms and catalytic material atoms in a sputter deposition ambient is adjusted by selecting at least one of controlling a density of said catalytic material in said target and controlling an exposed surface area of a target portion comprised of catalytic material.

22. (Previously Presented) The method of claim 16, wherein said barrier layer is deposited by sputter deposition, whereby a precursor gas containing said catalytic material is supplied during the deposition of said barrier layer.

23. (Canceled)

24. (Canceled)

25. (Canceled)

26. (Canceled)

27. (Canceled)

28. (Canceled)

29. (Previously Presented) A method of forming a metal layer over a patterned dielectric formed on a substrate, the method comprising:

depositing a first material layer over said patterned dielectric in a gaseous deposition atmosphere including, at least temporarily, a catalytic material, wherein depositing said first material layer comprises establishing said gaseous deposition atmosphere by sputtering atoms of said first material off a target and supplying a precursor containing said catalytic material; and

exposing said first material layer to a plating solution including ions of the metal to be deposited, wherein said catalytic material incorporated in said first material layer

initiates a reaction to reduce metal ions and to form a metal layer on said first material layer.

30. (Currently Amended) A method of forming a metal layer over a patterned dielectric formed on a substrate, the method comprising:

depositing a first material layer over said patterned dielectric in a gaseous deposition atmosphere including, at least temporarily, a catalytic material, wherein depositing said first material layer comprises establishing said gaseous deposition atmosphere by supplying one or more precursor gases, whereby at least one of said precursor gases includes said catalytic material;

exposing said first material layer to a plating solution including ions of the metal to be deposited, wherein said catalytic material incorporated in said first material layer initiates a reaction to reduce metal ions and to form a metal layer on said first material layer; and

adjusting a ratio of atoms of said first material and of said catalytic material in said gaseous deposition atmosphere

31. (Previously Presented) A method of forming a metallization layer, comprising:

depositing a catalytic material over surface portions of a patterned structure by at least one of chemical vapor deposition, physical vapor deposition, atomic layer deposition and plasma treatment;

forming a metal layer above said patterned structure by electroless plating deposition using a plating solution, wherein said catalytic material initiates a reaction between agents of said plating solution; and
depositing a barrier layer on said patterned structure, wherein said barrier layer is deposited by the same deposition technique as said catalytic material and wherein said barrier layer is deposited by sputter deposition, whereby a precursor gas containing said catalytic material is supplied during the deposition of said barrier layer

32. (Previously Presented) A method of forming a metallization layer, comprising:
depositing a catalytic material over surface portions of a patterned structure by at least one of chemical vapor deposition, physical vapor deposition, atomic layer deposition and plasma treatment;
forming a metal layer above said patterned structure by electroless plating deposition using a plating solution, wherein said catalytic material initiates a reaction between agents of said plating solution; and
depositing a barrier layer on said patterned structure, wherein said barrier layer is deposited by the same deposition technique as said catalytic material and wherein said barrier layer is deposited by atomic layer deposition, whereby at least at the end of the deposition of said barrier layer a precursor containing said catalytic material is present

33. (Previously Presented) A method of forming a metallization layer, comprising:
depositing a catalytic material over surface portions of a patterned structure by at least one of chemical vapor deposition, physical vapor deposition, atomic layer deposition and plasma treatment;
forming a metal layer above said patterned structure by electroless plating deposition using a plating solution, wherein said catalytic material initiates a reaction between agents of said plating solution; and
depositing a barrier layer on said patterned structure, wherein said catalytic material is deposited after the deposition of said barrier layer without breaking the vacuum established during the deposition of said barrier layer
34. (Previously Presented) The method of claim 33, wherein said barrier layer is deposited by the same deposition technique as said catalytic material.
35. (Previously Presented) The method of claim 33, wherein said barrier layer is deposited by sputter deposition, whereby at least a portion of a sputter target comprises said catalytic material.
36. (Previously Presented) The method of claim 35, wherein a ratio of barrier material atoms and catalytic material atoms in a sputter deposition ambient is adjusted by selecting at least one of controlling a density of said catalytic material in said target and controlling an exposed surface area of a target portion comprised of catalytic material.

37. (Previously Presented) The method of claim 33, wherein said barrier layer is deposited by sputter deposition, whereby a precursor gas containing said catalytic material is supplied during the deposition of said barrier layer.

38. (Previously Presented) The method of claim 33, wherein said barrier layer is deposited by atomic layer deposition, whereby at least at the end of the deposition of said barrier layer a precursor containing said catalytic material is present.

39. (Previously Presented) A method of forming a metal layer over a patterned dielectric formed on a substrate, the method comprising:

depositing a first material layer over said patterned dielectric in a gaseous deposition atmosphere including, at least temporarily, a catalytic material, wherein depositing said first material layer comprises establishing said gaseous deposition atmosphere by sputtering atoms of said first material off a target and supplying a precursor containing said catalytic material;

exposing said first material layer to a plating solution including ions of the metal to be deposited, wherein said catalytic material incorporated in said first material layer initiates a reaction to reduce metal ions and to form a metal layer on said first material layer; and

adjusting a ratio of atoms of said first material and of said catalytic material in said gaseous deposition atmosphere.